

## CLAIMS

What is claimed is:

1. A spinal fixation apparatus for stabilizing a plurality of bone segments comprising:

5 an elongate member having a first opening formed therethrough, said first opening being defined by a concave sidewall;

a means for attaching the elongate member to at least one human vertebra of the spine, the means for attaching  
10 having a first portion and a second portion, the first portion having a tapered-exterior surface; and

a receiving member configured for placement in said first opening and for receiving said means for attaching, said receiving member having a first aperture therethrough,  
15 said first aperture being defined by a tapered sidewall;

wherein said tapered-exterior surface of the first portion of said means for attaching and the tapered sidewall of said receiving member matingly engage forming a locking friction fit between said means for attaching and said  
20 receiving member, and wherein said receiving member is configured and dimensioned relative to the first opening of the elongate member to remain movable within said first opening after implantation in a semiconstrained manner.

2. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 1, said elongate member further comprising a top surface, a bottom surface and a retaining member, said retaining member extending laterally from said first opening on said top surface of said elongate member for retaining said receiving member within said first opening.

3. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 1, said elongate member further comprising a depressable retaining lip, said depressable retaining lip having an upright, open position with respect to said elongate member and a pivot point such that said depressable retaining lip may pivotally rotate about said pivot point when said retaining lip depresses downwardly into a horizontal, closed position.

4. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 1, said elongate member further comprising a top surface, a bottom surface and a lower rim, said lower rim extending laterally from said first opening on said bottom surface to thereby support and

maintain said receiving member within said first opening and preclude said receiving member from advancing completely through said first opening.

5           5.    The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 1, said second portion of said means for attaching having a male-external threading for threaded advancement into at least one of the plurality of bone segments.

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          6.    The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 1, said tapered exterior surface of the first portion forming a head of said means for attaching, said head having a top surface with a recess  
15   formed therein for receiving a driving instrument.

          7.    The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 1, said means for attaching further comprising a blunt tip extending from said  
20   second portion.

8. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 1, said receiving member having a larger diameter than said first opening.

5 9. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 1, said receiving member having a convex exterior surface for at least partially engaging said sidewall of said elongate member.

10 10. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 9, said convex exterior surface of said receiving member being smaller than said corresponding concave sidewall of said elongate member such that said receiving member may move relative to said first  
15 opening permitting micro-adjustments in said spinal fixation apparatus.

11. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 1, said elongate member  
20 having a second opening, said elongate member further having a longitudinal axis dividing a first side from a second side, said first and second openings being formed between a top and bottom surface of said elongate member, and the

first opening being located in the first side and the second opening being formed in the second side.

12. The spinal fixation apparatus for stabilizing a  
5 plurality of bone segments of claim 11, wherein said first and second openings may be circularly shaped and have a circumferential edge defining a diameter of said first and second openings.

10 13. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 1, wherein said elongate member comprises a horizontal axis and said receiving member has a geometry such that said receiving member may be movable within said first opening of said elongate member  
15 without rotating 180 degrees within said first opening with respect to the horizontal axis.

14. A spinal fixation apparatus for stabilizing a plurality of bone segments comprising:  
20 an elongate member having a first opening formed therethrough, said first opening being defined by a concave sidewall;

a means for attaching the elongate member to at least one human vertebra of the spine, the means for attaching having a first portion and a second portion, the first portion having a tapered-exterior surface; and

5 a receiving member having a convex exterior surface configured and dimensioned for partially engaging the concave sidewall of said elongate member, said receiving member further having a first aperture formed therethrough, said first aperture being defined by a tapered sidewall;

10 wherein said tapered-exterior surface of the first portion of said means for attaching and the tapered sidewall of said receiving member matingly engage forming a locking friction fit between said means for attaching and said receiving member.

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15. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 14, said elongate member further comprising a top surface, a bottom surface and a retaining member, said retaining member extending laterally  
20 from said first opening on said top surface of said elongate member for retaining said receiving member within said first opening.

16. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 14, said elongate member further comprising a depressable retaining lip, said depressable retaining lip having an upright, open position and a pivot point such that said depressable retaining lip may pivotally rotate about said pivot point when said retaining lip depresses downwardly into a horizontal, closed position.

17. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 14, said elongate member further comprising a top surface, a bottom surface and a lower rim, said lower rim extending laterally from said first opening on said bottom surface to thereby support and maintain said receiving member within said first opening and preclude said receiving member from advancing through said first opening.

18. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 14, said second portion of said means for attaching having a male-external threading for threaded advancement into at least one of said plurality of bone segments.

19. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 14, said tapered- exterior surface forming a head of said means for attaching, said head having a top surface with a recess formed therein.

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20. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 14, said means for attaching further comprising a blunt tip extending from said second portion.

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21. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 14, said receiving member having a larger diameter than said first opening of said elongate member.

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22. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 14, said convex exterior surface of said receiving member configured to be smaller than said corresponding concave sidewall of said elongate member such that said receiving member may move relative to said first opening causing micro-adjustments in said spinal fixation apparatus.

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23. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 14, said elongate member having a second opening, said elongate member further having a longitudinal axis dividing a first side from a second side, said first and second opening being formed between a top and bottom surface of said elongate member, and the first opening being located in the first side and the second opening being formed in the second side.

24. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 23, wherein said first and second openings may be circularly shaped and each opening has a circumferential edge defining a diameter of said first and second openings.

25. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 14, wherein said elongate member comprises a horizontal axis and said receiving member has a geometry such that said receiving member may be movable within said first opening of said elongate member without rotating 180 degrees within said first opening with respect to the horizontal axis.

26. A spinal fixation apparatus for stabilizing a plurality of bone segments comprising:

an elongate member having a concave sidewall defining a first opening formed therethrough and a retaining portion  
5 extending from said first opening;

a means for attaching the elongate member to at least one human vertebra of the spine, the means for attaching having a first portion and a second portion, the first portion having a tapered-exterior surface; and

10 a receiving member having a convex exterior surface configured and dimensioned for partially engaging the concave sidewall of said elongate member, said receiving member further having a tapered sidewall defining a first aperture therethrough;

15 wherein said tapered-exterior surface of the first portion of said means for attaching and the tapered sidewall of said receiving member being disposed in mating engagement forming a locking friction fit, and said receiving member being further configured and dimensioned such that said  
20 receiving member may be movable within the first opening even after the locking friction fit has been formed such that the retaining portion maintains said receiving member within said first opening.

27. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 26, said elongate member further comprising a top surface, a bottom surface and a lower rim, said retaining member extending laterally from said first opening on the top surface and said lower rim extending laterally from said first opening on said bottom surface to thereby support and maintain said receiving member within said first opening and preclude said receiving member from advancing through said first opening.

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28. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 26, said second portion of said means for attaching having a male-external threading for threaded advancement into at least one of said plurality of bone segments.

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29. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 26, said tapered exterior surface forming a head of said means for attaching, said head having a top surface with a recess formed therein.

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30. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 26, said means for

attaching further comprising a blunt tip extending from said second portion.

31. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 26, said receiving member having a larger diameter than said first opening of said elongate member.

32. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 26, said elongate member having a second opening, said elongate member further having a longitudinal axis dividing a first side from a second side, said first and second opening being formed between a top and bottom surface of said elongate member, and the first opening being located in the first side and the second opening being formed in the second side.

33. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 32, wherein said first and second openings may be circularly shaped and have a circumferential edge defining a diameter of said first and second openings.

34. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 26, wherein said elongate member comprises a horizontal axis and said receiving member has a geometry such that said receiving member may be movable within said first opening of said elongate member without rotating 180 degrees within said first opening with respect to the horizontal axis.

35. A spinal fixation apparatus for stabilizing a plurality of bone segments comprising:

an elongate member comprising a first portion and a second portion, said elongate member having a first opening, said first opening being defined by a sidewall;

a depressable retaining portion formed in the first portion of said elongate member and interconnected with said sidewall of said first opening, the depressable retaining portion having a substantially upright, open position and substantially horizontal, closed position with respect to said elongate member; and

a receiving member configured for receiving a fastener and having an exterior surface for engaging the sidewall of said first opening;

wherein the depressable retaining portion may be initially in the upright, open position allowing the passage of the receiving member into the first opening, thereafter the depressable retaining portion may be depressed, closing  
5 said depressable retaining portion and maintaining the receiving member within said first opening.

36. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 35, said first portion  
10 and said second portion of said elongate member being a top surface and a bottom surface respectively.

37. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 35, said elongate member  
15 further comprising a lower rim, said lower rim extending laterally from said first opening on said second portion of said elongate member to thereby support and maintain said receiving member within said first opening and preclude said receiving member from advancing completely through said  
20 first opening.

38. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 35, wherein said

fastener further comprises a means for attaching said apparatus to the plurality of bone segments, said means for attaching having a tapered-head portion and a male-external threaded portion for threaded advancement into at least one  
5 of the plurality of bone segments.

39. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 38, said tapered-head portion having a top surface with a recess formed therein  
10 for receiving a driving instrument.

40. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 38, said means for attaching further comprising a blunt tip extending from said  
15 male-external threaded portion.

41. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 35, said receiving member having a larger diameter than said first opening when  
20 said retaining portion is in the horizontal, closed position.

42. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 35, said exterior surface of said receiving member being a convex shaped exterior surface for partially engaging said sidewall of said elongate member.

43. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 42, wherein said sidewall of said elongate member having a concave shape, wherein said convex exterior surface of said receiving member being smaller than said corresponding concave sidewall of said elongate member such that said receiving member may move relative to said first opening permitting micro-adjustments in said spinal fixation apparatus.

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44. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 35, said receiving member having a first aperture, said first aperture being defined by a tapered sidewall, said fastener further comprising a means for attaching said apparatus to the plurality of bone segments, said means for attaching having a tapered first portion and a second portion, wherein said second portion may be inserted through said first aperture



engaging said tapered first portion with said tapered sidewall forming a locking friction fit between said means for attaching and said receiving member.

5           45. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 35, said elongate member having a second opening, said elongate member further having a longitudinal axis dividing a first side from a second side, said first and second opening being formed between a  
10 top and bottom surface of said elongate member, and the first opening being located in the first side and the second opening being formed in the second side.

          46. The spinal fixation apparatus for stabilizing a  
15 plurality of bone segments of claim 45, wherein said first and second openings may be circularly shaped and have a circumferential edge defining a diameter of said first and second openings.

20           47. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 35, wherein said elongate member comprises a horizontal axis and said receiving member has a geometry such that said receiving

member may be movable within said first opening of said elongate member without rotating 180 degrees within said first opening with respect to the horizontal axis.

5           48. A spinal fixation apparatus for stabilizing a plurality of bone segments comprising:

          an elongate member comprising a top portion and a bottom portion, said elongate member having a first opening formed therethrough, said first opening being defined by a  
10   concave sidewall;

          a means for attaching the elongate member to at least one human vertebra of the spine, the means for attaching having a first portion and a second portion, the first portion having a tapered-exterior surface, and the second  
15   portion having external threads thereon for insertion into at least one of the plurality of bone segments; and

          a receiving member having a convex exterior surface for engaging the concave sidewall of said elongate member, said receiving member further having a first aperture formed  
20   therethrough for receiving said means for attaching, said first aperture being defined by a tapered sidewall;

          wherein the second portion of the means for attaching may be inserted through the first aperture of the receiving

member and into at least one of the plurality of bone segments; and

wherein the tapered-exterior surface of the first portion of said means for attaching and the tapered sidewall of said receiving member may be matingly engaged in a friction fit, and wherein said receiving member is configured and dimensioned relative to the first opening of the elongate member to remain movable within said first opening after implantation in a semiconstrained manner.

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49. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 48, said elongate member further comprising a retaining member, said retaining member extending laterally from said first opening on said top surface for retaining said receiving member within said first opening.

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50. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 48, said elongate member further comprising a depressable retaining lip, said depressable retaining lip having an upright, open position with respect to said elongate member and a pivot point such that said depressable retaining lip may pivotally rotate

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about said pivot point when said retaining lip depresses downwardly into a horizontal, closed position.

51. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 48, said elongate member further comprising a lower rim, said lower rim extending laterally from said first opening on said bottom surface to thereby support and maintain said receiving member within said first opening and preclude said receiving member from advancing completely through said first opening.

52. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 48, said tapered exterior surface forming a head of said means for attaching, said head having a top surface with a recess formed therein for receiving a driving instrument.

53. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 48, said means for attaching further comprising a blunt tip extending from said second portion.

54. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 48, said receiving member having a larger diameter than said first opening.

5        55. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 48, wherein said convex exterior surface partially engages said concave sidewall of said elongate member.

10        56. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 48, said convex exterior surface of said receiving member being smaller than said corresponding concave sidewall of said elongate member such that said receiving member may move relative to said first  
15 opening permitting micro-adjustments in said spinal fixation apparatus.

57. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 48, said elongate member  
20 having a second opening, said elongate member further having a longitudinal axis dividing a first side from a second side, said first and second opening being formed between a top and bottom surface of said elongate member, and the

first opening being located in the first side and the second opening being formed in the second side.

58. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 57, wherein said first and second openings may be circularly shaped and have a circumferential edge defining a diameter of said first and second openings.

59. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 48, wherein said elongate member comprises a horizontal axis and said receiving member has a geometry such that said receiving member may be movable within said first opening of said elongate member without rotating 180 degrees within said first opening with respect to the horizontal axis.

60. A method of assembling a spinal fixation apparatus comprising the steps of:

obtaining an elongate member comprising a first portion and a second portion, the elongate member further having a first opening with a predetermined dimension;

obtaining a receiving member configured and dimensioned to have an outside diameter larger than said first opening with said predetermined dimension;

cooling the receiving member to a temperature  
5 sufficient for causing the receiving member to contract such that the receiving member may be inserted into said first opening with said predetermined dimension in said elongate member;

heating the receiving member to thereby cause said  
10 receiving member to expand back to said receiving member's original size and shape.

61. The method of assembling a spinal fixation apparatus of claim 60, wherein the step of cooling the  
15 receiving member further includes inserting said receiving member into liquid nitrogen to thereby cause contraction of said receiving member.

62. The method of assembling a spinal fixation  
20 apparatus of claim 60, wherein obtaining said elongate member further includes the step of providing said elongate member with a retaining member, said retaining member extending laterally from said first opening on said first

portion of said elongate member for retaining said receiving member within said first opening.

63. The method of assembling a spinal fixation  
5 apparatus of claim 60, wherein obtaining said elongate member further includes the step of providing said elongate member with a depressable retaining lip, said depressable retaining lip having an upright, open position with respect to said elongate member and a pivot point such that said  
10 depressable retaining lip may pivotally rotate about said pivot point when said retaining lip depresses downwardly into a horizontal, closed position.

64. The method of assembling a spinal fixation  
15 apparatus of claim 60, wherein obtaining said elongate member further includes the step of providing said elongate member with a lower rim, said lower rim extending laterally from said first opening on second portion to thereby support and maintain said receiving member within said first opening  
20 and preclude said receiving member from advancing completely through said first opening.



65. The method of assembling a spinal fixation apparatus of claim 60, wherein the method further comprises the step of attaching said spinal fixation apparatus to at least one vertebra.

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66. The method of assembling a spinal fixation apparatus of claim 60, wherein attaching said spinal fixation apparatus includes using a bone screw having a tapered head portion and a threaded shank portion for  
10 advancing said bone screw into a bone, said tapered head portion having a top surface with a recess formed therein for receiving a driving instrument.

67. The method of assembling a spinal fixation  
15 apparatus of claim 66, wherein obtaining said receiving member further includes the step of providing said receiving member with a first aperture formed therethrough, said first aperture being defined by a tapered sidewall for mating engagement with said tapered head portion forming a locking  
20 friction fit.

68. The method of assembling a spinal fixation apparatus of claim 60, wherein obtaining said receiving

member further includes the step of providing said receiving member with a larger diameter than said first opening.

69. The method of assembling a spinal fixation  
5 apparatus of claim 60, wherein obtaining said elongate member further includes the step of providing said first opening with a concave sidewall defining said first opening.

70. The method of assembling a spinal fixation  
10 apparatus of claim 69, wherein obtaining said receiving member further includes the step of providing said receiving member with a convex exterior surface for partially engaging said concave sidewall of said elongate member.

15 71. The method of assembling a spinal fixation apparatus of claim 70, wherein obtaining said receiving member further includes the step of providing said receiving member with said convex surface being smaller than said corresponding concave sidewall of said elongate member and  
20 thereby providing movement of said receiving member within said first opening permitting micro-adjustments in said spinal fixation apparatus.

72. The method of assembling a spinal fixation apparatus of claim 60, wherein obtaining said elongate member further includes the step of providing said elongate member with a second opening, said elongate member further  
5 having a longitudinal axis dividing a first side from a second side, said first and second opening being formed between said first and second portions of said elongate member, and the first opening being located in the first side and the second opening being formed in the second side,  
10 wherein said first and second openings may be circularly shaped and have a circumferential edge defining a diameter of said first and second openings.

73. The method of assembling a spinal fixation  
15 apparatus of claim 60, wherein obtaining said elongate member further includes the step of providing said elongate member with a horizontal axis and obtaining said receiving member further includes the step of providing said receiving member with a geometry such that said receiving member may  
20 be movable within said first opening of said elongate member without rotating 180 degrees within said first opening with respect to the horizontal axis.

74. A method of attaching a spinal fixation device to the spinal region comprising the steps of:

locating an elongate member comprising a first portion and a second portion, said elongate member having a concave  
5 sidewall defining a first opening formed therethrough;

obtaining a receiving member having a convex exterior surface for engaging the concave sidewall of said elongate member, said receiving member further having a tapered sidewall defining a first aperture therethrough;

10 inserting a fastener having an upper portion and a lower portion, the upper portion having a tapered-exterior surface, and the lower portion having external threads thereon for insertion through said first aperture of said receiving member and into a vertebral bone;

15 intercoupling the tapered-exterior surface of the fastener with the tapered sidewall of the receiving member through continual insertion of the lower portion of fastener into the vertebral bone until said tapered-exterior surface engages said tapered sidewall in a locking friction fit,  
20 and wherein said receiving member is configured and dimensioned relative to the first opening of the elongate member to remain movable within said first opening after implantation in a semiconstrained manner.

75. A method of attaching a spinal fixation device to the spinal region comprising the steps of:

locating an elongate member having a sidewall defining  
5 a first opening formed therethrough onto the spinal region;

adjusting a position of a previously installed  
receiving member, having an exterior surface, within the  
first opening such that the exterior surface partially  
engages the sidewall of the elongate member such that said  
10 receiving member may be rotated within said first opening of  
said elongate member, said receiving member further having a  
tapered sidewall defining a first aperture therethrough; and

inserting a fastener through the first aperture of said  
receiving member, the fastener having an upper portion and a  
15 lower portion, the upper portion having a tapered-exterior  
surface, and the lower portion having external threads  
thereon for insertion into a vertebral bone;

wherein placing the lower portion of said fastener  
through said first aperture in said receiving member and  
20 screwing said lower portion into the vertebral bone of the  
spine causes the tapered-exterior surface to matingly engage  
the tapered sidewall of said receiving member such that an  
friction locking fit occurs.

76. A method of attaching a spinal fixation device to the spinal region comprising the steps of:

locating an elongate support member having a sidewall defining a first opening formed therethrough onto the spinal region, the elongate support member further having a  
5 depressable retaining lip with a substantially upright, open position and a substantially horizontal, closed position;

positioning a receiving member within the first opening of the elongate support member while the depressable  
10 retaining lip resides in the upright, open position, the receiving member having an exterior surface for partially engaging the sidewall of the elongate member such that said receiving member may be rotated within said first opening of said elongate member, said receiving member further having a  
15 tapered sidewall defining a first aperture therethrough;

depressing the depressable retaining lip thereby closing said depressable retaining lip;

inserting a fastener through the first aperture of the receiving member, the fastener having a first portion and a  
20 second portion, the first portion having a tapered-exterior surface for matingly engaging the tapered sidewall of the first aperture, the second portion having external threads thereon for insertion into the vertebral bone;

wherein placing the second portion of said fastener through said first aperture in said receiving member and screwing said second portion into the vertebral bone of the spine causes the tapered-exterior surface to matingly engage the tapered sidewall of said receiving member such that an friction locking fit occurs.

77. A fixation apparatus for stabilizing a plurality of bone segments comprising:

an attachment member having a first opening formed therethrough, said first opening being defined by a concave sidewall;

a fastener for attaching the attachment member to at least one human bone segment, the fastener having a first portion and a second portion, the first portion having a tapered-exterior surface; and

a receiving member configured for placement in said first opening and for receiving said fastener therein and wherein said receiving member is configured and dimensioned relative to the first opening of the attachment member to remain movable within said first opening after implantation in a semiconstrained manner, said receiving member having a

first aperture therethrough, said first aperture being defined by a tapered sidewall;

wherein said tapered-exterior surface of the first portion of said fastener and the tapered sidewall of said receiving member matingly engage forming a locking friction fit between said fastener and said receiving member.

78. A spinal fixation apparatus for stabilizing a plurality of bone segments comprising:

an elongate member having a first opening formed therethrough, said first opening being defined by a concave sidewall;

a fastener for attaching the elongate member to at least one human vertebra of the spine, the fastener having a first portion and a second portion, the first portion having a tapered-exterior surface; and

a receiving member having a convex exterior surface configured and dimensioned for partially engaging the concave sidewall of said elongate member, said receiving member further having a first aperture formed therethrough, said first aperture being defined by a tapered sidewall;

wherein said tapered-exterior surface of the first portion of said fastener and the tapered sidewall of said



receiving member matingly engage forming a locking friction fit between said fastener and said receiving member.

79. A fixation apparatus for stabilizing a plurality  
5 of bone segments comprising:

an attachment member having a first opening formed therethrough, said first opening being defined by a concave sidewall;

a fastener for attaching the attachment member to at  
10 least one human bone segment, the fastener having a first portion and a second portion, the first portion having a tapered-exterior surface; and

a non-expandable receiving member configured for placement in said first opening and wherein said receiving  
15 member is configured and dimensioned relative to the first opening of the attachment member to remain movable within said first opening after implantation in a semiconstrained manner, said receiving member having a first aperture therethrough for receiving said fastener therein, said first  
20 aperture being defined by a tapered sidewall;

wherein said tapered-exterior surface of the first portion of said fastener and the tapered sidewall of said receiving member matingly engage without expanding said

receiving member forming a locking friction fit between said fastener and said receiving member.

80. A fixation apparatus for stabilizing a plurality  
5 of bone segments comprising:

an attachment member having a first opening formed therethrough, said first opening being defined by a concave sidewall having a first radius of curvature;

a fastener for attaching the attachment member to at  
10 least one human bone segment, the fastener having a first portion and a second portion, the first portion having a tapered-exterior surface; and

a receiving member having a first aperture formed therethrough for receiving said fastener therein, said first  
15 aperture being defined by a tapered sidewall, said receiving member being configured for placement in said first opening and having an exterior surface that comprises a second radius of curvature that is different than said first radius of curvature of the first opening of said attachment member;

20 wherein the difference in radii of curvature between said first radius of curvature and said second radius of curvature creates a zone of contact between the concave sidewall of the first opening and the exterior surface of

the receiving member thereby locking said receiving member to said attachment member; and

wherein said tapered-exterior surface of the first portion of said fastener and the tapered sidewall of said receiving member matingly engage without expanding said receiving member to thereby form a locking friction fit between said fastener and said receiving member.

81. A fixation apparatus for stabilizing a plurality of bone segments comprising:

an attachment member having a first opening formed therethrough;

a fastener for attaching the attachment member to at least one human bone segment, the fastener having a first portion and a second portion, the first portion having a tapered-exterior surface; and

a receiving member having a first aperture formed therethrough for receiving said fastener therein, said first aperture being defined by a tapered sidewall, said receiving member being configured for placement in said first opening; and

wherein said tapered-exterior surface of the first portion of said fastener and the tapered sidewall of said

receiving member are configured and dimensioned to matingly engage together without causing expansion of said receiving member to thereby form a locking friction fit between said fastener and said receiving member.

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82. The spinal fixation apparatus for stabilizing a plurality of bone segments of claim 81, wherein said receiving member is configured and dimensioned relative to the first opening of the attachment member to remain movable within said first opening after implantation in a semiconstrained manner, and wherein the attachment member comprises an elongate cervical plate configured and dimensioned for attachment to the cervical spine.

15 83. A spinal fixation apparatus for stabilizing a plurality of bone segments comprising:

an elongate spinal plate comprising a top surface and a bottom surface, and a first side and a second side, said elongate spinal plate having a longitudinal axis dividing the first side from the second side, said elongate spinal plate further having a horizontal axis and at least one pair of concave sidewalls defining at least one pair of openings formed between the top and bottom surface and the at least

one pair of openings being located in each of the first side and second side, said at least one pair of openings being circularly shaped and having a circumferential edge further defining a diameter of said at least one pair of openings, and at least one elongate hole extending between the top surface and the bottom surface, being formed along the longitudinal axis of said elongate spinal plate and located between said first and second side;

a retaining lip extending inward from said at least one pair of openings, forming a portion of the circumferential edge of said elongate spinal plate and being integrally formed in the top surface of said elongate spinal plate;

a lower rim extending inward from said at least one pair of openings, being integrally formed in the bottom surface of said elongate spinal plate, such that the at least one pair of concave sidewalls may be located between the retaining lip and the lower rim;

a fastener for attaching the elongate spinal plate to at least one human vertebra of the spine, comprising a head portion and a shank portion, the head portion having a tapered-exterior surface and a recess formed in said head portion for receiving a screw driving instrument, the shank portion having an external threading thereon for advancing

said fastener into at least one of the plurality of bone segments of the spine; and

a receiving member having a convex exterior surface for partially engaging the at least one pair of concave sidewalls of said elongate spinal plate, the receiving member further having a tapered sidewall defining a first aperture therethrough for receiving said head portion of said fastener, said convex exterior surface having a diameter larger than the diameter of each of said at least one pair of openings such that the receiving member may be maintained within each of said at least one pair of openings without fully engaging said at least one pair of concave sidewalls to thereby permit adjusting of said receiving member within said at least one pair of openings during the settling of said elongate spinal plate, wherein said receiving member has a geometry such that said receiving member may be movable within said at least one pair of openings of said elongate spinal plate without rotating 180 degrees within said at least one pair of openings with respect to the horizontal axis of the elongate spinal plate;

wherein the shank portion of the fastener may be inserted through the first aperture of the receiving member and into at least one of the plurality of bone segments, and

causing a mating engagement between the tapered-exterior surface of the head portion of said fastener and the tapered sidewall of said receiving member forming a locking friction fit, such that said receiving member may be movable within  
5 said at least one pair of openings with respect to said elongate spinal plate.